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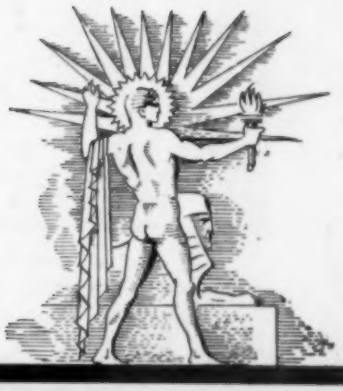
SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE •



SEPTEMBER 24, 1932

Whose Ancestor?

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SCIENCE NEWS LETTER

VOL. XXII *No. 598*

The Weekly Summary of Current Science

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Edited by WATSON DAVIS

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? DO YOU KNOW THAT ?

Rayon is being produced experimentally from bamboo in India.

Pear trees 126 years old are bearing fruit in an orchard at the mission of San Juan Bautista, in California.

Cactus plants, associated with western deserts, grow in at least one form in all the states except Maine, New Hampshire and Vermont.

It is reported that in one section of London inhabited by about 120,000 of the laboring classes, four times as much beer as milk is bought in a year.

The Bureau of Standards finds that the production of sound-absorbing materials for offices and halls has increased fourfold in the past three years.

The Field Museum has on exhibit a necklace of rock crystal beads said to be the only one ever found in the territory of the Mayan Indians, in tropical America.

They had strikes in ancient Rome, such as the strike of the temple flute-players, who refused to play when denied their privilege of dining in the shrine of Jove—and they won the strike.

Mirrors exposed to strong sunlight will become cloudy.

The Prague Gas Works has developed what is said to be a substitute for asphalt.

The lake formed by Hoover Dam on the Colorado river will be the largest artificial body of water.

Porous ebonite, made from latex, may be used in the manufacture of light rubber board for airplanes.

German chemists have devised a new moth repellent which is 90 parts soap and 10 parts sodium selenate.

The sugar in sweet corn will turn to starch much less rapidly if the corn is kept in a cool place while it is stored before cooking.

Studies of certain Mexican cactus plants are being made to determine whether their drug properties can be exploited commercially.

The "world's loneliest radio station" is on Willis Island, 400 miles east of Australia, where two operators keep and transmit weather records.

WITH THE SCIENCES THIS WEEK

Curiosity arousing questions for the teacher and general reader. Book references in italic type are not sources of information of the articles, but are references for further reading. Books cited can be supplied by Librarian, Science Service, at publisher's price, prepaid in U. S.

ANTHROPOLOGY

How old is the Norwegian people? p. 196

When did the Asselar man live? p. 202. *Source Book in Anthropology—A. L. Kroeber and T. T. Waterman. Harcourt*, 1931, $3.75.

ARCHAEOLOGY

Is the little ivory head on the cover a true portrait or merely a representation of a man? p. 191. *Ancient Americans—Emily Davis. Holt*, 1931, $3.50.

Where are the newly found Arctic rock forts? p. 191

AVIATION-PHYSIOLOGY

How may aviators fly higher than present record altitudes without danger to their health? p. 196

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Are bacteria found in coal as old as the coal itself? p. 196

Can a streptococcus change its shape? p. 192. *Who's Who Among the Microbes—Park and Williams. Century*, 1929, $3.

ENTOMOLOGY

What is the stinkhorn fungus? p. 202. *The Romance of the Fungus World—R. T. and F W. Rolfe. Lippincott*, 1926, $3.50.

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What causes the strange trances of Balkan women? p. 203

GENERAL SCIENCE

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When was Mt. Washington last occupied by a party of scientists? p. 193. *Climate—W. G. Kendrew. Oxford*, 1930, $5.

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MEDICINE

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PHYSICS

How nearly has absolute zero been achieved? p. 197

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What mass is given the new particle of matter suggested by Dr. Anderson and Dr. Millikan? p. 197

PLANT PATHOLOGY

Why did Dr. Vinson freeze and then squeeze diseased tobacco plants? p. 200

PSYCHOLOGY

Can speeding motorists with five figures in their license numbers be easily caught? p. 191

How accurately can man be trained to judge time? p. 191

How will the odor of citronella affect your eyesight? p. 196

PUBLIC HEALTH

How many colds do members of families living at home have in a year? p. 192

ARCHAEOLOGY

Prehistoric Rock Forts Found On Barren Arctic Island

Art Work at Abandoned Site Declared by Discoverer, Dr. Hrdlicka, to Be Among Fine Art of Early America

See Front Cover

REPORTS of finding inaccessible rock fortresses in the sea, used by people of the Far North many centuries ago, are brought back from Kodiak Island, Alaska, by Dr. Ales Hrdlicka of the U. S. National Museum.

Dr. Hrdlicka's discovery reveals for the first time that inhabitants of the North in ancient times had to take extreme methods of protection, very much as Pueblo Indians in the Southwest entrenched themselves on mesa tops. The fortresses discovered in the North are rocky islets off Kodiak Island coast. On the flat summits of these high cliffs, Dr. Hrdlicka discovered ruins of villages strategically placed by the ancient people who had some formidable enemy to fear, perhaps because they had enviable wealth in sea otter skins.

Ascent of the cliffs to reach one of these abandoned villages, Dr. Hrdlicka found, was a real "mountain-goat climb." Not even spade or camera could he carry with him. Yet the old inhabitants must have packed their supplies year after year up the weary ascent.

"Kodiak Island is a unique archaeological site," said Dr. Hrdlicka. "This island, neglected by archaeologists, can be studied for a hundred years and continue to shed light on aboriginal America.

"The chief result of this year's work is the definite ascertainment that there lived on the island in the course of time two distinct types of people, one the old and one more recent. Just who the old people were is not yet certain. While slightly Eskimoid, their main resemblance is to the Indian.

Finding Higher Cultures

"It has been argued that only the crudest elements of culture were brought into America, and that all the rest of the Indians' art and industry were developed in America. Yet, the deeper we dug into the older remains of Kodiak Island, the higher the type of culture we met. These oldest natives made beautifully shaped knives of slate. They made lamps from rounded pieces of hard basalt and granite, and weapons some of which are of types found for the first time in American archaeology. Among the carvings of fossil ivory is a portrait of a man, so cleverly carved that it must take rank among the fine art of prehistoric America. It is a true portrait, not a mere representation of a man."

The curling lip, which gives such an expression of disdain to the face, is due to a round ornament inserted in a slit in the lower lip. Eyes of the portrait were probably of stone, but these were missing when the ivory head was unearthed. Holes in the sides of the head indicate that the likeness was intended to be worn on a string, probably around some one's neck.

Petroglyphs, or picture writings on the rocks, were found in astonishing quantity. Science knows of no way to decipher these records of the ancient people, but there is much scientific interest in studying them. Dr. Hrdlicka reports that Kodiak Island contains the richest and best collection of petroglyphs of any site north of Mexico.

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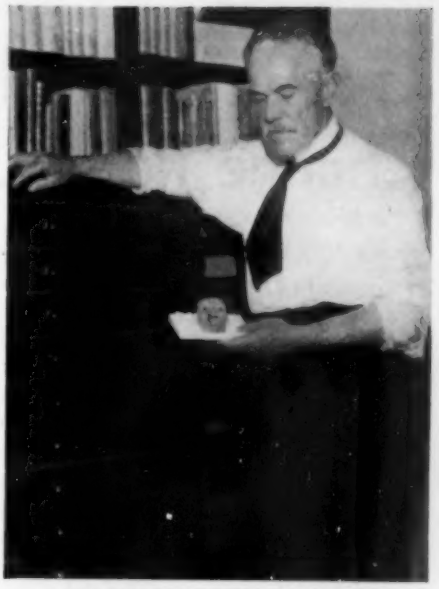

TROPHY OF THE NORTH

Dr. Hrdlicka is holding the little ivory head which was enlarged for the cover.

PSYCHOLOGY

Men Are Trained to Be Human Clocks

MEN CAN be trained to judge time so that as "human clocks" they run slow by only two tenths of one per cent., Dr. Samuel Renshaw, of Ohio State University, has reported to the American Psychological Association. Contrary to popular belief, however, tapping with hands or feet or counting increases the error, he said.

Science News Letter, September 24, 1932

PSYCHOLOGY

Five Digits Are Too Many For Auto License Tags

MORE THAN four numbers on a license plate makes it impossible to catch speeding drivers by noting their numbers, Dr. James L. Graham, of Lehigh University, warned psychologists at their recent national meeting in Ithaca. A specially devised apparatus with a reducing lens which changed the apparent distance, made it possible to test in the laboratory ability to read plates rapidly fading into distance.

With three-number plates in black letters on a white ground, 94 per cent. were seen correctly, but only nine per cent. of seven-number plates were legible. Only 64 per cent. of five-number plates could be read, although speed used in the laboratory was only a third to a fifth of usual road speeds, Dr. Graham found.

Bright reflecting surfaces greatly reduce legibility, he said, and color is also important. When lighted only by the tail light, blue on orange background is about 30 per cent. better than the same colors reversed.

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BACTERIOLOGY

Germs From Sleeping Sickness Change Form Like Butterflies

THAT A METAMORPHOSIS or change in form similar to that of butterflies is part of the regular life cycle of certain germs, is suggested by the work of Miss Alice C. Evans, senior bacteriologist of the U. S. Public Health Service, who has investigated germs cultivated from cases of encephalitis.

This disease is sometimes called sleeping sickness because extreme drowsiness and lethargy are characteristic symptoms. Germs belonging to the family of streptococci have been recovered from these cases. These are small round germs, well-known to bacteriologists, and the cause of many diseases. They cannot pass through the pores of fine filters. Investigating these germs, Miss Evans was astonished to find them change into the long narrow germ known to bacteriologists as rods. Also, she found that sometimes these germs were able to pass through her fine-pored filters.

Thought They Knew

A few years ago, bacteriologists were certain they knew all about the lives and habits of the well-known germ families, like the streptococci. Some germs might be round and some straight, some reproduced by dividing or splitting and some by growing spores. But they all remained true to type all their lives, and did not change forms like butterflies and many other living creatures that spend part of their life cycle in one form and part in another.

In fact, bacteriologists were so sure of the stability of germ families that when they saw a rod-shaped germ growing in a family of round ones, they concluded that the rod was a contaminating organism that had gotten into the colony by mistake. For the most part they are right about this, but Miss Evans' studies led her to suggest that bacteriologists may for years have been seeing the rod-forms of round streptococci and mistaking them for contaminating organisms of another family.

Waver From Form to Form

The germs exist in the body either in the filterable form or in several different forms of bacteria, Miss Evans thinks. It is only with difficulty that the germs living in the body can adjust themselves to growing on artificial material outside the body. For the first few days after they have been transferred from the body to the artificial growth material, they waver from one form to another. But once they are established on ordinary culture material, one form or the other grows and multiplies indefinitely without variation.

The rod-shaped form of the germ that Miss Evans investigated was more virulent in animals than the familiar coccus form. However, she could not conclude that one or the other form was the cause of the disease in humans.

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PHYSICS

Cosmic Ray Work Sped By Recording Electroscopes

WITHIN four months Dr. Robert A. Millikan hopes to determine whether latitude affects in small degree the intensity of the ray and exactly to what extent its effects vary with altitude at higher levels than those at which accurate measurements have thus far been made.

Dr. Millikan is now making cosmic ray observations in the northern part of the United States after having made a scientific journey to northern Manitoba where airplanes of the Royal Canadian Air Force carried his electroscopes to altitudes of over 20,000 feet.

Dr. Millikan and his associate, Dr. Victor Neher, had previously made observations at Lake Arrowhead, 5200 feet high and some 65 miles east of the California Institute of Technology, of which Dr. Millikan is chairman of the executive council. They used both the older style of cosmic ray electroscope and the newer self-recording electroscope, designed by both scientists and built by Dr. Neher.

In ten years of research on cosmic radiation, Dr. Millikan has made observations in various parts of the world, both in the Arctic and at the equator; but he relies more on the observations made at Lake Arrowhead, at Pasadena, at Churchill, Manitoba, and at Pikes Peak than at his other observation posts. It is especially at Arrowhead that he has developed his technique of lake measurements, for Arrowhead is a body of water free from radioactive constituents and holds few minerals in solution, since its waters are derived from melted snow in the nearby mountains.

In making the observations, Drs. Millikan and Neher take their electroscopes and attendant apparatus, all weighing 900 pounds, out in small boats seven or eight hundred feet from shore in water 200 or (*Turn to page* 200)

PUBLIC HEALTH

College Students Found to Have Three Colds Per Year

EACH COLLEGE student averages three colds a year. Members of families living at home, however, average only about half a cold a year, or one every two years.

The figures are from a study of the incidence and time distribution of common colds just published by the U. S. Public Health Service. The study was made by Dr. Wade H. Frost of the Johns Hopkins School of Hygiene and Public Health and Mary Gover, associate statistician of the U. S. Public Health Service.

The higher incidence of colds in college students might be due to conditions of student life, or might be due to more accurate reporting on the part of the students.

Both at home and at college there were more colds in the period from September to March than in the April to September period. The latter half of July and the first half of August was the period in which there were fewest colds. The attack rates in the different student groups, which were scattered all over the country, were remarkably uniform, showing no consistent relation to latitude, longitude or climate.

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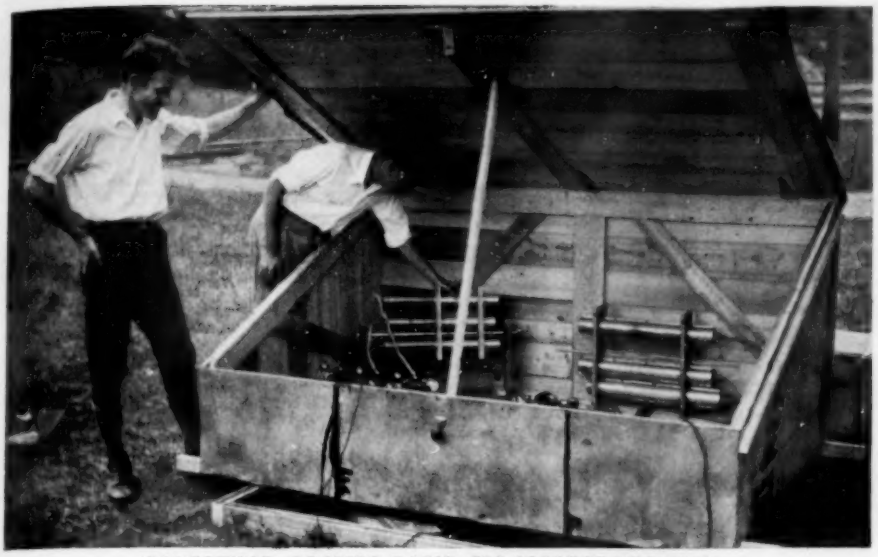


COUNTING COSMIC RAYS ON MOUNTAIN TOP

On the summit of New England's highest peak, Mt. Washington, N. H., Dr. T. H. Johnson, left, and Dr. J. C. Street, right, are measuring cosmic radiation with an electrical telescope that automatically counts the rays. The effects of the earth's field on the directional distribution of cosmic rays are being studied, and thus far the scientists seem to be finding a slightly greater intensity of radiation in the magnetic meridian. This party will leave the mountain before the polar year scientists begin their observations for the winter.

GENERAL SCIENCE

Scientific Party to Occupy Mt. Washington During Winter

THE SUMMIT of famous Mount Washington, highest of the White Mountains, will be occupied by a scientific party this fall for the first time since 1887. Weather, aurora, magnetic, radio and other observations will be made at this frigid point, 6,288 feet high, as a part of the second polar year program being participated in by many nations this year and next.

The observing program is being arranged under the direction of Joseph B. Dodge, manager of the Appalachian Mountain Club huts in the White Mountains, with the cooperation of leading scientists, among them Dr. Charles F. Brooks, director of the Blue Hill Observatory of Harvard University, Prof. J. W. Goldthwait of Dartmouth College and Dr. Norman E. Gilbert, president of the New Hampshire Academy of Science.

Three observers will live on the summit from Oct. 15 to June 15 of next year. In recent winter seasons the mountain has been abandoned to the wind and cold and a few intrepid mountaineers, although during the summer months hundreds of tourists visit the summit by cog railroad, auto road or trail. A hotel is operated at the summit during the summer, but the rigors of arctic winter weather close the peak to casual visitors about October 15.

59 Degrees Below Zero

Although geographically in the temperate zone, the summit of Mount Washington is climatologically in the arctic. It is above the timber line and temperatures as low as 59 degrees zero Fahrenheit and wind velocities up to 186 miles per hour were recorded there during the 17 years, 1871-1887, that government weather bureau observations were made there winter and summer. The observations this winter, made with the most modern instruments, will be an important part of the extensive probing of the inconstants of nature provided by the polar year plans.

At the Pinkham Notch headquarters camp of the Appalachian Mountain Club, weather and other observations will be made regularly during the winter to provide a basis of comparison for the observations made on the Mount Washington summit, two and one-half miles air line distance, but 4,281 feet higher in altitude. Mr. Dodge has spent eleven years, summer and winter, in the White Mountains, living with his family at Pinkham Notch. He will manage the expedition and serve as relief on the summit for the regular observers, as well as operate the comparison station at Pinkham Notch. In earlier winter observations nearby comparison stations were lacking.

To Have Radio Station

A complete radio station with call letters WIOB will be installed on the summit to allow the observers to communicate with polar year expeditions in the far north and other points in the outside world. Constant communication will be maintained with Mr. Dodge's radio station, WIUN, at Pinkham Notch. There will also be regular schedules with Boston and other cities for the transmission of daily weather and magnetic observations. The transmitters will use the amateur frequency bands of 3,500 to 4,000, 7,000 to 7,300, and 14,000 to 14,400 kilocycles. Considerable work is planned in ultra high frequency bands at 56 megacycles or above. A special power plant will feed the tubes with an output of 250 watts.

The observers on the summit will be: Robert Scott Monahan of Pawtucket, R. I., Salvatore Pagliuca, a native of Milan and now with the General Electric Company, Lynn, Mass., and either Albert Wise of Brookline, Mass., or Alexander McKenzie of Albany, N. Y. Monahan is a graduate of Dartmouth and Yale Forestry School and this summer is a member of the expedition to Mount Fairweather, 15,300-foot Alaskan peak. All are experienced and well equipped.

Although not as high as western mountain peaks, such as Pike's Peak, Mount Washington has temperatures and winds that are not equalled on higher mountains on the continent. The expedition during the coming winter will recall the hardships suffered during the winters of the 70's and the 80's by the observers that occupied the signal station of those days and made the first continuous weather records from any American mountain top.

Mount Washington has taken its toll of human life. William Stevens died in the weather service at the summit in 1872 and hikers have died of exposure on several occasions attempting summer ascents. Two youths died in a storm last January near the summit, the first winter casualty from exposure.

ANATOMY

Your Ideal Weight

A Student of the Human Figure Has Found Ankle Size the Key to Correct Weight and More Perfect Body Proportions

By JANE STAFFORD

WHAT is your ideal weight?

You may consider yourself too fat or too thin, or you may be lucky enough not to need to worry over the extra pounds. Still, by what standard are you measuring yourself?

Are you comparing yourself with Jean Harlow or Johnny Weismuller? Maybe you are comparing your actual weight with the average for several hundred men or women of your age and height, such as appears above the penny-in-the-slot scales. However, none of this gives you the correct figure for what you, yourself, should weigh, scientists now think.

Your weight is not only a personal matter, but an exclusive and individual affair. The key to what you should weigh lies in your own ankle girth.

If you have the skeletal equipment of a Juno dieting yourself down to the "average" weight may give you a thin, hungry look and a figure that is unattractively bony. On the other hand, if your ten-year-old Jimmie weighs less than your neighbor's ten-year-old Buster, Jimmie's ideal weight should be determined before you start stuffing him to make him catch up with Buster.

Originator is Medical Artist

Out in California where styles in figures are set for the whole country, a new system for determining ideal weight has been developed.

Its originator is David P. Willoughby, a medical artist of Los Angeles. Mr. Willoughby has had no training in medical sciences but he has drawn pictures to illustrate medical books. Through constant study of the human body he is said to have become far more familiar with its bony framework and muscles than the average physician. Being an artist, he is primarily interested in body proportions. In fact, he considers correct body proportions more important to health than absolutely ideal weight.

"The possibility that an individual may be of the optimal weight prescribed for its height and bony framework, does not insure that he is properly proportioned," said Mr. Willoughby. "And since it is incontestable that the proportions of the body are of far greater physiologic significance than is the mere measure of his total bulk, it follows that the distribution of the fleshy tissues is the factor of most importance in connection with optimal body-build."

Physicians may not agree with him in this, but they are interested in new and better methods of determining ideal body weight, such as Mr. Willoughby has worked out.

The method is the result of many years' labor during which time measurements were made of a considerable number of physically excellent individuals of both sexes—52 men and 20 women. It has been endorsed by many observers, and recently Dr. E. Kost Shelton of Santa Barbara reported at a meeting of the Society for the Study of Internal Secretions his successful results with it. It may be applied to all adults of the white race, regardless of nationality or so-called type of body build.

"It is based upon the principle that the fleshy parts of the body should be of a bulk in direct ratio to the size or thickness of the bony framework, irrespective of the height at which this is encountered," Dr. Shelton explained. "It therefore prescribes the optimal, not the average, girth and diameter measurements, skeletal and fleshy, of every part of the body and when considered with the height, it proposes a body-weight commensurate with these figures."

While the bony framework is important in determining your best weight, it is not the weight of the bones alone that must be considered, Dr. Shelton pointed out. Doctors have learned from long experience that there is some relationship between your skeleton and your weight.

"It has become a custom, when comparing persons of approximately the same height, casually to explain their weight differences by the variation in the size of their bones," Dr. Shelton observed.

However, the difference in weight between large-boned and small-boned skeletons of about the same height is actually only a few pounds, while their owners may have differed in weight by many pounds. The greater part of this difference in weight in the living persons must have been made up for by the soft tissues, fat and muscle and body fluids. The large-boned person, for example, must have larger muscles than a small-boned person. Likewise his system of blood vessels must be large enough to supply his big body with blood, and he must have enough fat and fluids to keep him healthy and, incidentally, to make him look as well as his smaller-boned brother. All of these tissues, muscles, blood and blood vessels, fat and fluids, add to his weight.

Enough Poundage for Frame

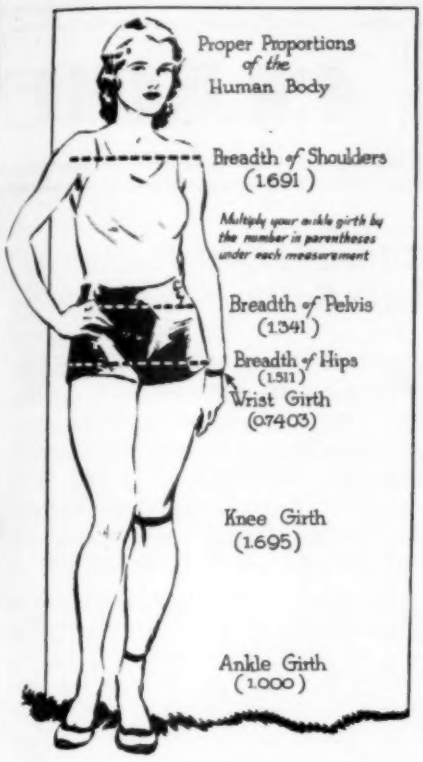
So a method of determining your ideal weight takes into consideration all these factors and allows you enough poundage to be adequately supplied with them in proportion to your bony framework.

Mr. Willoughby's weight-determination method involves the application of certain fundamental geometric relationships which he has observed in the human body. He compares the body dimensions—those pertaining to length, area and volume—to a cyclinder. The length of the cylinder is represented by the stature or height of your body; the area of an horizontal cross-section is represented by the square of the unit taken to denote the general thickness of the skeleton, he explained in a description of his method appearing in the *Research Quarterly* of the American Physical Education Association.

The body weight—volume of the cylinder—should vary as the denoted thickness of the skeleton, squared, multiplied by the stature or height.

"Thus variation in volume or weight of the body is accounted for as due not only to variation in its length (stature), but also to variation in the girth or cross-sectional area of its bony framework and the superlying musculation which should vary in correspondence therewith," he stated.

"No single measure of skeletal breadth or thickness can be assumed in the individual as an index of general


Proper Proportions of the Human Body
Breadth of Shoulders (1.691)
Multiply your ankle girth by the number in parentheses under each measurement
Breadth of Pelvis (1.341)
Breadth of Hips (1.511)
Wrist Girth (0.7403)
Knee Girth (1.695)
Ankle Girth (1.000)

thickness of bony framework," he pointed out.

He therefore takes six measures representing the degree of skeletal thickness in various parts of the figure. These measures are then converted into a single size-unit, the ankle girth, which is taken as a basis from which to determine and prescribe all the girth and diameter measurements of the body and the weight.

Takes Six Measurements

The six measurements which he takes are the breadth of the shoulders, breadth of the pelvis, breadth of the hips, the girth of the wrist, girth of the knee and girth of the ankle. The girth measurements used are the average of the measurements for right and left sides. The ankles are measured at the thinnest part, above the ankle bone. You should be standing squarely on both feet for these measurements. The knees are measured across the kneecap. The wrist measurements are taken between the bony knobs and the hand, with the hand open and in line with the forearm and the fingers extended. These measurements should be taken with a steel measuring tape. The breadth of shoulders, pelvis and hips are measured with a calipers.

These measurements are "corrected" for the ankle girth. Then Mr. Willoughby uses a formula reminiscent of your high school algebra. The corrected ankle girth measure is squared, the squared value is multiplied by the observed measure in stature, and the product is divided by a "constant." The answer is the number of pounds of ideal or optimal body weight for the individual being measured.

Better Results for Men

In the development of his method, Mr. Willoughby found that it gives better results for men than for women. This is bound to be the case, he explained, in any rule proposed for reconciling a person's natural muscular development with his underlying bony framework. In women the thickness of the fat under the skin in relation to the thickness of the musculature varies more than in men. The fleshy parts of women's bodies are less uniformly developed in relation to the development of their bones than is the case with men, so rules about the proportion between bones and flesh are less reliable for women than for men.

Likewise certain of the skeletal measurements are a better indication of general thickness of frame for women and certain ones are better for men. For example, the broad shoulders of the husky athlete are not the best indication of his skeletal thickness. The best single criterion of skeletal thickness in the muscularly-developed man is the girth of the knee. Girth of ankle and girth of wrist come next, then breadth of pelvis, breadth of hips and finally breadth of shoulders.

The girth of Milady's dainty wrist, on the other hand, is the best criterion of her skeletal thickness. Next come the breadth of her hips, then girth of knee and breadth of shoulders. The girth of her ankle may win her a prize in the beauty contest, but it rates next to last as index of her skeletal thickness, according to Mr. Willoughby, who puts it just before the least reliable index measure in women, breadth of pelvis.

The relative value of these measures becomes important when determining ideal weight for persons so fat that it is impossible to get reliable figures for the six measurements which Mr. Willoughby's method requires. In very fat people, it may not be possible to find the hip bones, for example, and thus the measure of breadth of hips would be inaccurate. In such cases, Mr. Willoughby takes the girth of the knee in men and the girth of the wrist in women from which to derive his corrected ankle girth measure used in the final computation of optimal weight. He hopes, incidentally, that the X-rays may some day aid in determining the skeletal thickness of very well-padded subjects.

The matter of ideal body proportions and weight intrigued the ancients, and the early Greek sculptors had certain definite rules of proportion which they are said to have derived from standards devised by the Egyptians as early as 3000 B. C. However, Mr. Willoughby developed his method from a premise based on the judgment of Leonardo da Vinci regarding bodily proportions. This great Italian artist and anatomist thought that body proportions could not be governed by general measurements, but that they were an individual affair. In other words, correct proportions for you must be determined from your own measurements. Leonardo said:

"All parts of an animal should correspond with the whole; that which is short and thick, should have every member short and thick; that which is long and thin, every member long and thin; and that which is between the two, members of a proportionate size."

Not Applied to Children Yet

That was Mr. Willoughby's idea when he worked out his method of weight determination. So far, it has not been applied to children, but that will be the next step. Meanwhile, the method has been used by Dr. Shelton and associates both in private practice and in their clinics at the St. Francis and Cottage Hospitals in Santa Barbara. Here is how it works:

The 16-year-old daughter of a very obese, large-boned woman had been told repeatedly that she was from 50 to 60 pounds overweight. She was in despair, and resigned to becoming the same enormous size as her mother. Her actual weight was 187 pounds. According to the Wood table of heights and weights, she was 58 pounds overweight; according to a life insurance company table, 48 pounds overweight. With the method of Mr. Willoughby, Dr. Shelton found this girl only 27 pounds overweight. This was not such an appalling figure to the girl, and she entered into the spirit of rehabilitation and dietary reeducation eagerly. Her appearance after reducing the amount indicated by the Willoughby figures showed that she had reached her own best weight for her bony framework.

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AVIATION-PHYSIOLOGY

Pilots Can Fly Higher Without Death Danger

AIRPLANE pilots could rise to altitudes of fifty thousand feet, nearly ten miles, without danger of death from the rigorous experience if the nitrogen gas in their bodies is expelled before they leave earth by breathing oxygen for one hour before the ascent.

Sir Leonard Hill, the eminent British physiologist, has so concluded in a communication to *Nature*, as the result of experiments on animals under low pressure conditions.

Previous experiments in France had led to the conclusion that about 45,000 feet is the limit of altitude that can be reached by man with safety, even when oxygen-equipped, unless his whole body is enclosed in a pressure chamber that shields him from the effects of the great height. Death from high altitude might sometimes come the day after the experience, experiments on animals showed.

Science News Letter, September 24, 1932

GEOGRAPHY

Greatest Ocean Deeps Listed By Hydrographic Office

THERE'S a hole in the bottom of the sea. There are, in fact, several. A summary of the deepest "deeps" in each ocean has just been officially published by the Hydrographic Office, under the authority of the Secretary of the Navy.

The greatest known ocean depth is in the Pacific, under the shadow of the American flag. This is Mindanao Deep, 35,400 feet, near the Philippine Islands, in latitude approximately 9 degrees, 41 minutes, 18 seconds north, longitude 126 degrees 50 minutes 15 seconds east. This is the most recently discovered of the great deeps, having been found in 1927 by the new German cruiser Emden. Other soundings of more than 30,000 feet have been made in several places in the western part of the North Pacific. In the South Pacific the greatest depth is the Aldrich Deep, north of New Zealand, 30,930 feet.

The Atlantic cannot boast such depths. The deepest sounding known in the North Atlantic is Nares Deep, approximately 27,972 feet, in West Indian waters. The deepest spot in the South Atlantic is a sounding of 26,575 feet made in 1926 by the German survey ship Meteor. This is far out at sea, the nearest land being the forsaken island of South Georgia, east of the southern tip of South America.

The other oceans show lesser depths than this. The Indian Ocean has the Wharton Deep, about 22,968 feet, south of Java and east of Cocos Island. A sounding of 17,850 feet was made in the Arctic Ocean by Sir Hubert Wilkins in 1927, and a depth of 14,274 in the Antarctic is shown by a British Admiralty chart.

Science News Letter, September 24, 1932

ANTHROPOLOGY

Norwegians Always Same, Archaeologist Declares

NORTHERN Norwegians have been Norwegians ever since the Stone Age, Prof. A. W. Brögger, Norse archaeologist, declares. His investigations have shown a continuous culture, with no evidence of new racial additions, from the time the first Germanic settlers went into the country on the heels of the retreating glaciers of the Ice Age. He has traced the story of his countrymen through Stone, Bronze and Early Iron Ages. Throughout their long history, they have been what they are today: farmers on the land and sailors, especially whalers, at sea.

Science News Letter, September 24, 1932

GENETICS

Intelligent Race of Rats Shows Way to Super-Man

A RACE of super-men in intelligence might be attained through selective breeding, provided social factors ever permitted the experiment, it is indicated by experiments reported to the American Psychological Association by Dr. R. C. Tryon of the University of California. Such a super-intelligent race has actually been produced among rats in his laboratory, he reported.

He has also produced by selective breeding a race of moron rats. The bright "family" display their superiority throughout most of the life span, and are succeeded by superior progeny.

In this first experiment thus demonstrating the hereditary nature of intelligence, the entire environment was kept strictly the same for both races of rats. The inheritance of physical factors such as weight, sex, pigmentation, and fertility seemed to have no relation to the inheritance of mental ability.

Science News Letter, September 24, 1932

IN SCIE

PSYCHOLOGY

Citronella Odor Makes Sight Keener

A WHIFF of the odor of oil of citronella will make you see better, it is indicated by experiments reported to the American Psychological Association by Dr. George W. Hartmann, of Pennsylvania State College. Stimulation of other senses has a similar effect on vision, he found.

"Apparently lights, sounds, smells, pressures and pains do have some property or properties in common, for how otherwise would one account for their similar influence on visual acuity?" he said. The results suggest that one sense might replace another, he concluded.

Science News Letter, September 24, 1932

BACTERIOLOGY

Doubt Cast on Antiquity Of Bacteria Found in Coal

BACTERIA found inside lumps of hard coal are not necessarily as old as the coal, in the opinion of Prof. Homer G. Turner of Pennsylvania State College. They may be of quite recent origin, and have been carried into the coal through pores or crevices by water.

Prof. Turner has examined anew the evidence advanced by Prof. C. B. Lipman of the University of California, for the great antiquity of bacteria which he found within lumps of anthracite.

The coal seam from which Prof. Lipman's samples came, Prof. Turner reports, is closer to the surface than was at first considered to be the case. Moreover, it slopes upward to a surface outcrop, through which water can filter, and conceivably carry bacteria with it. As a further possibility of bacterial contamination from the outside, Prof. Turner points out the constant presence of bacteria carrying air and water in the mine itself. He also suggests the improbability of the delicate living protoplasm of bacteria surviving the terrific pressure and the probable high temperatures of the earth.

Science News Letter, September 24, 1932

FIELDS

ARCHAEOLOGY

New Paintings of the Buddha Found in Caves

PRICELESS frescoes and carvings of Buddhist art have been brought to light in the caves of Ajanta, in India. The discoveries include works of art that were previously known to exist but had been considered irrevocably lost.

The walls of these famous Indian caves are painted and carved with relics of the Buddhist religion and its founder, one of the great teachers in history, but a great many of these ancient scenes have never been recorded or described. The work of systematic preservation and cleaning was undertaken in 1920 under supervision of two Italian experts, and is now being carried on by Indian artists.

Among the Buddhist scenes brought to light is one showing girls bathing near a beautiful grove. This is a painting said to be at least two thousand years old.

A fresco of about the fifth century A. D. shows the incarnation of Buddha as an elephant, in which form he offers himself to hungry hunters to appease their need. Another scene of renunciation shows pieces of Buddha's flesh being roasted on a fire.

Science News Letter, September 24, 1932

ARCHAEOLOGY

Ancient Palestinian People Burned Bones of Dead

A STRANGE people who lived in Palestine thousands of years before Abraham saw the land, a people who practiced cannibalism and burned the bones of their dead, are described by Sir Arthur Keith, noted English anthropologist.

The remains of these people were found by Miss Dorothy Garrod of the British School of Archaeology in Palestine at Shukbah in the Judean hills and in caves on Mount Carmel. It is proposed to call them Natufians from the name of the cave in which they were found, and because they are like no known people. They appear, however, to be related to the Mediterranean stock, having affinities with the New Stone Age people of the Alta, and with the negroid skeleton remains found in the Cave of Grimaldi on the Riviera or with the predynastic peoples of Egypt. They were a long-headed people of short stature, not more than five and a half feet tall.

It was the habit of these people to extract two of the upper front teeth from jaws of their women in their youth. They also appear to have practiced cannibalism, judging from the way the bones are cut and fractured.

Their most curious practice, however, was that they collected the bones of their dead after they had been freed from animal matter by burial or exposure and burned them.

Curiously enough the same custom seems to have been practiced at Ur. Sir Arthur Keith has received from Dr. Leonard Woolley a box of bones from under the foundations of Ur which had also been cremated when dry. The bones of women predominated. Similar burial skulls had been found in the ruins of Zimbabwe in Rhodesia.

Was there, asks Sir Arthur, a custom in ancient times of digging up the bones of ancestors and submitting them to the ordeal of fire?

Science News Letter, September 24, 1932

PHYSICS

Another Step Taken Toward Absolute Zero

ABSOLUTE ZERO, the completely cold point at which all temperature ceases, is only seven-tenths of a degree beyond the reach of physics now. Absolute zero is 273 degrees Centigrade below the freezing point of water; and Prof. W. H. Keesom of Leiden University has succeeded in producing a temperature of minus 272.3 degrees.

This is one-tenth of a degree lower than the previous record. A tenth of a degree does not amount to much at ordinary temperatures, but when the almost unattainable cold of absolute zero is the goal, the last few tenths of degrees are like the last few hundreds of feet to alpinists trying to climb to the summit of Mount Everest.

Prof. Keesom obtained his low temperature by keeping a small quantity of liquid helium constantly stirred while he produced a high vacuum over it by means of a pair of powerful mercury pumps.

Science News Letter, September 24, 1932

PHYSICS

New Atomic Particle Suggested by Experiments

THE PROBABLE existence of a new particle of matter is reported by Dr. Carl D. Anderson of the California Institute of Technology, who works in association with Dr. Robert Andrews Millikan. It is a positively charged particle of the mass of the familiar negative electron. The usual positive particle is the proton that has a mass 1850 times that of the electron.

The evidence for the new light-weight positive particle is contained in several photographs made while measuring the energies of charged particles produced by cosmic rays. Some tracks were found which seem to be produced by the new positive particles. The only alternative, Dr. Anderson states in his report to *Science*, is that two electrons made independent tracks on the photographs as they had the same point of origin. This probability is very unlikely.

Science News Letter, September 24, 1932

MEDICINE

Liver Extract Wins Place In New Pharmacopoeia

LIVER EXTRACT, used in treating pernicious anemia, is one of the remedies discovered since 1920 to win a place in the new U. S. Pharmacopoeia.

This volume is the legal standard for drugs in the United States and Cuba. It is revised only once in ten years.

One hundred and eight titles of drugs contained in the U. S. P. X. have been dropped from the U. S. P. XI, the General Chairman, E. Fullerton Cook of Philadelphia, has just announced.

Among the 24 new admissions are: anti-meningococcus serum, used for treating meningitis; anti-pneumococcus serum used for pneumonia; carbon dioxide, used to treat gas poisonong; diphtheria toxin for the Schick test for susceptibility to diphtheria; diphtheria toxoid for giving protection against the disease; ephedrine and ephedrine sulphate, remedies used for relieving hay fever and asthma among other conditions; ethylene, a new anesthetic; rabies vaccine, used as a preventive of rabies or hydrophobia; and typhoid vaccine, for protection against typhoid fever.

Other titles includes insulin, for diabetes, and viosterol, a vitamin D preparation, have been tentatively admitted.

Science News Letter, September 24, 1932

PHYSICS

Determination of the Speed of Light

"A Classic of Science"

Foucault Invented the Standard Method of Measurement Used With Many Refinements by the Late A. A. Michelson

COMPTES RENDUS Hebdomadaires des Séances de l'Académie des Sciences, Tome 55, Paris, 1862.

Détermination expérimentale de la vitesse de la lumière; parallaxe du Soleil; (*Experimental determination of the speed of light; parallax of the sun*): *and*

Détermination expérimentale de la vitesse de la lumière; description des appareils; (*Experimental determination of the speed of light; description of the apparatus*);

By Leon Foucault. Translated for the Science News Letter by Helen M. Davis.

AT THE MEETING of May 6, 1850, I gave the result of a differential experiment upon the speed of light in two media of unequal densities; and at the same time I indicated that the same method, based upon the use of a revolving mirror, would serve to measure the absolute velocity of light through space.

When this project had been thoroughly discussed, the Director of the Observatory wished to hasten its performance and placed at my disposal the necessary resources. At the beginning of summer the apparatus was ready for use, but the bad weather did not allow me to begin as promptly as I should have wished the observations which required the presence of sunlight. But the sky finally cleared, and, profiting by these last beautiful days, I obtained results which seem to me to contain something pretty close to the expression of truth.

The actual apparatus did not differ essentially from that previously described except for the addition of a clockwork designed to move a circular screen toothed for the exact measurement of the speed of the mirror, and for the extension of the experimental line which, by means of multiple reflections, was carried from 4 to 20 meters. By thus increasing the length of the ray of light and applying more exactness to the measure of the time, I got determinations whose extreme variations do not exceed 1/100 and which, compared with their mean, give a series agreeing within 1/500.

As the result, the speed of light turns out to be notably diminished. Following the accepted values, this velocity would be 308 million meters per second, and the new experiment with the revolving mirror gives, in round numbers, 298 million.

We may, it seems to me, rely on the accuracy of this figure, in the sense that the corrections to which it is subject ought not to raise it more than 500,000 meters.

If we accept this new figure and combine it with the constant of aberation 20″.45 to deduce the parallax of the sun which is evidently a function of these two, we find, instead of 8″.57 the notably greater value of 8″.86. Thus the mean distance of the earth from the sun is diminished by about 1/30.

To give an idea of the degree of confidence which can be accorded to the series of observations used in this instance, I shall copy here a list of rough determinations chosen from those whose average agrees least with the general mean.

1024	1026
1025	1026
1029	1026
1028	1025
1027	1026
1026	1028
1027	1028
1025	1027
1026	1026.5
1027	1027

Mean 1026.47

This number 1026.47 agrees with an arbitrary length which belongs to the apparatus and which may be varied for each determination, in such a way as to produce a constant displacement of the image deflected by the revolving mirror.

In an early communication I promise to give a description of the apparatus sufficient to provide a basis for discussion and to acknowledge the ability and the services of the eminent workers who have been kind enough to assist me.

The Apparatus

In spite of limited space and lack of figures, I shall try to describe the main parts of the apparatus with which I obtained such a different value for the speed of light from that which has been current in science.

This apparatus is composed of:

A micrometric scale cut through the surface of a sheet of silvered glass;

A revolving mirror carried upon the axis of a little wind turbine;

A blower of constant pressure;

An achromatic objective;

A series of an odd number of concave spherical mirrors of silvered glass;

A mirror inclined for partial reflection;

A microscope for the micrometer,

And a circular screen in the form of a toothed wheel moved by clockwork.

I shall first describe the apparatus at rest.

A ray of sunlight reflected horizontally by a heliostat falls upon the micrometric scale which consists of a series of vertical lines 1/10 millimeter apart. This scale, which in the experiment is the real standard of measure, was ruled with much care by M. Froment. The rays which have passed through this original plane impinge at the distance of 1 meter upon the mirror rotating in a plane surface, where they undergo a first reflection which sends them back a distance of 4 meters to a first concave mirror. Between these two mirrors, and as close as possible to the plane mirror, is placed the objective,

Experiments by the same Foucault who measured light, laid the foundation for the invention of the

Gyroscopic Compass

by Sperry, who describes it in

THE NEXT CLASSIC INVENTION

having on one side the virtual image of the scale and on the other the concave mirror at its two conjugate foci. When these conditions are fulfilled, the ray of light, after passing through the objective, forms an image of the scale at the surface of the first concave mirror.

Hence the ray is reflected a second time in a direction sufficiently oblique to avoid the apparatus with the rotating mirror, of which it forms an image at a certain distance in space. At the place where this image appears is placed a second concave mirror, turned in such a way that the ray again reflected passes back near the first spherical mirror to form a second image of the scale; this is sent back by a third concave surface, and so on to the formation of a final image of the scale by a final odd-numbered concave mirror. I have been able to use up to five mirrors which develop a line 20 meters long.

The last of these mirrors, separated from the next-to-last, which faces it, by a distance of 4 meters, equal to its radius of curvature, sends the ray back exactly upon itself, a condition which is fulfilled accurately by superposing the returning image upon the outgoing one at the surface of the mirror opposite; this done, we can be certain that the ray reassembles the series, returns in its entirety by way of the plane mirror of the rotating apparatus and that finally all the rays appear on the scale, point by point, as they started out.

We can verify this return of the rays and procure an accessible image by turning aside by partial reflection at the surface of a mirror inclined at 45° a part of the ray which we can examine with a low-power microscope. This last, corresponding in every respect to the micrometric microscopes used in astronomical observations, forms with the scale and the inclined mirror a very stable combination.

In the apparatus thus described, the real image sent back to the microscope and formed the partially reflected return rays occupies a definite position with respect to the mirror and the scale itself. This position is precisely that of the virtual image of the scale seen by reflection in the plane of the mirror. At least it has that position when the apparatus is at rest. But when the plane mirror begins to turn, this image changes place, because during the time that the light took to traverse twice the broken line of concave mirrors, the rotating mirror continued to turn and the rays upon their return no longer find it at the same incidence as at the time of their arrival. As a result the image is displaced in the direction of motion of the mirror and this *deviation* increases with the speed of rotation; it evidently increases also with the length of the path and with the distance which separates the scale and the turning mirror. The way in which these various quantities are related in the experiment, hence the speed of light itself, is shown by a very simple formula which has been established and which I shall only quote here.

Calling V the velocity of light, n the number of revolutions per second of the mirror, l the length of the broken line included between the revolving mirror and the last concave mirror, r the distance from the scale to the revolving mirror and d the deviation observed, we find by inspection of the apparatus

$$V = \frac{8\pi nlr}{d},$$

an expression which gives the velocity of light in terms of quantities which it is possible to measure separately.

The distances l and r are measured directly with a rule or a strip of paper which can be compared with the unit of length. The deviation d can be observed micrometrically; but it remains to be shown how the number n of revolutions of the mirror per second can be determined.

Let us first explain how a constant velocity is impressed upon the mirror:

This mirror of silvered glass, which is 14 millimeters in diameter, is mounted directly upon the axis of a little air turbine of well-known design, admirably made by M. Froment. The air for it is furnished by a high pressure blower by M. Cavaillé-Coll, who has acquired a just reputation in building large organs. Since it is important that the pressure be very constant, upon leaving the blower the air passes through a regulator recently devised by M. Cavaillé in which the pressure does not vary more than 1/5 of a millimeter in a column of water 30 centimeters high. In flowing cut through the orifices of the turbine, the fluid thus represents a remarkably constant motive force. On the other hand, the mirror in accelerating soon meets resistance of the air about it which for a given velocity is also perfectly constant. The moving part held between these two contrary forces which tend to equilibrium cannot help but attain and keep a uniform velocity. Any obstruction to the outflow of the air moreover allows us to regulate this velocity within very narrow limits.

It remains finally to compute the number of revolutions or rather to impress upon the moving part a predetermined velocity. This problem has been completely solved in the following manner:

Between the microscope and the partially reflecting mirror is placed a circular disk, whose finely toothed edge infringes upon the image observed and intercepts a part of it; the disk turns uniformly upon itself, in such a way that if the image appears continuously, the teeth which it carries upon its circumference disappear from sight with the rapidity of the motion. But the image is not permanent, it results from a series of discontinuous appearances which are equal in number to the revolutions of the mirror, and in the particular case where the teeth of the screen also follow one another at the same rate, it produces to the eye an illusion easy to explain, which makes the teeth reappear as though the disk were not turning. Let us suppose then that the disk carrying n teeth on its circumference is making one turn per second and that at the same time we set the turbine in motion; if in regulating the outflow of the air motor we succeed in maintaining the apparent fixity of the teeth, we can know for certain that the mirror is really making n revolutions per second.

M. Froment, who made the turbine, has been kind enough to undertake to design and construct a clockwork to move the disk; this is a very remark-

RADIO

The Science Service radio address next week will be on the subject,

WHAT THE DEPRESSION IS DOING TO FAMILY LIFE

by

Dr. George K. Pratt

Associate Medical Officer for the National Committee for Mental Hygiene

FRIDAY, SEPT. 30

at 2.15 P. M, Eastern Standard Time

Over Stations of

The Columbia Broadcasting System

able piece of clockwork, which solves in an elegant way the problem of uniform motion in the particular case where there is no work to be done. Its success is so complete that every day I am able to start the mirror at 400 revolutions per second and to watch the two pieces of apparatus go in agreement of about 1/10,000 for whole minutes together.

Yet, in spite of having obtained such certainty on the side of measuring the time, I was surprised to find in my results discrepancies which were not in accord with the precision of the methods of measurement. After quite a long search, I finally found that the source of error was in the micrometer, which did not admit of nearly the degree of precision which we assumed for it. To meet this difficulty, I introduced into the system of observation a modification which finally resulted in a simple change of variable. Instead of measuring the deviation micrometrically, I adopt a value for this defined in advance, it shall be 7/10 of a millimeter or 7 whole divisions of the image, and I find by experiment what distance to establish between the scale and the revolving mirror to produce this deviation; the measurements have thus a length of about 1 meter, the lesser fractions still have a size visible directly and no longer allow room for error.

By this means the apparatus was cleared of the chief cause of uncertainty; since then the results have agreed within the limits of error of observation and the averages have been so constant that I am able to give with confidence the new value which it seems to me ought to represent something very close to the speed of light in space, namely: 298,000 kilometers per second of mean time.

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GENETICS

Dingo-Wolf Hybrid In Australian Zoo

SUCCESSFUL crossing between the dingo, wild dog of the Australian bush, and a male European wolf is reported in *Nature*. The litter of six pups, all female, was born in the zoological garden at Adelaide, Australia. One of the animals has been sent to Melbourne for hybridization experiments.

It is well known that dingo and domestic dogs can interbreed, but the present is apparently the first case on record of a cross with a wolf.

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GENERAL SCIENCE

Scientist Makes New List Of Extremes in Nature

THE BIGGEST elephant, the smallest germ, the shortest dwarf, the highest mountain, all the things of the universe to which can be applied the superlative "est," stir the human imagination.

Dr. B. S. Hopkins, University of Illinois professor who wrote his name into chemical history a few years ago by discovering the element illinium, has compiled in an article in the *Scientific Monthly* a list of the extremes of nature.

"Our natural curiosity which is stimulated by the use of the superlative degree is reenforced by the needs of our modern civilization," Dr. Hopkins observes. "A study of the extremes of nature soon passes far beyond the realm of mere curiosity and establishes itself as a means by which we can measure our progress in solving the problem of selecting the best material to serve our purpose in a certain specific application."

Some of nature's extremes include:

The heaviest substance known upon our earth is osmium, with a density which varies from 21.3 to 24.

The lightest substance known is hydrogen gas, unless there be considered highly evacuated X-ray tubes which

(Continued From Page 192)

more feet deep. Since the discharge of the electroscope in general is due to the cosmic rays and the radioactivity of the earth, the investigators feel that this location in and above non-radioactive water gives the best conditions under which to pursue their investigations.

Up to this time Dr. Millikan has obtained much evidence as to the nature of the cosmic ray by observing its effects through the eye piece on the electroscope. The newer apparatus contains a photographic film for permanently self-recording these effects. These records should render further repetition of these measurements unnecessary since any one interested will henceforth only need to come and measure up the films for himself, for these films will be completely free from the preconceptions as well as the errors of the individual observer.

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contain streams of electrons which are fragments of disrupted hydrogen atoms.

The hardest material is the diamond.

The most ductile and malleable of our metals is gold.

The highest temperatures which have been sustained for a considerable time and measured with reasonable accuracy are in the neighborhood of 3500 to 3800 degrees Centigrade.

The most extreme cold that has ever been reached is the melting point of solid helium, 272.2 degrees Centigrade below zero which is within eight-tenths of a degree of absolute zero, that theoretical point where all heat vanishes.

The most costly substance known to commerce is radium which sells at a price that corresponds to more than two million dollars per troy ounce, making radium worth more than a hundred thousand times its weight in gold.

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PLANT PATHOLOGY

Enzyme Theory of Virus Disease Upheld

EVIDENCE that the so-called "virus diseases" of plants and animals are caused by a non-living chemical substance that can attach itself to living matter, rather than by ultra-tiny living organisms, is claimed as the result of experiments on tobacco plants performed by Dr. Carl G. Vinson of the University of Missouri. Dr. Vinson's work apparently supports the belief, held on theoretical grounds by many physiologists and pathologists during the past thirty years, that the causes of these mysterious diseases of plants and animals are compounds analogous to enzymes, the digestive and respiratory "ferments" of normal organisms, but malefic rather than beneficent in their effects.

Frozen and Squeezed

Dr. Vinson's method of isolating the virus of tobacco mosaic was worked out during four years he spent at the Boyce Thompson Institute for Plant Research at Yonkers, N. Y., prior to coming to the University of Missouri. The first step was to freeze a quantity of

mosaic-infested tobacco plants. Then the dead plants were put under heavy pressure, squeezing out their juice.

Samples of this juice, filtered free of large particles, caused leaf mosaic when injected into healthy plants. The virus was thus evidently in the juice.

The next step was to separate the juice into its various constituents, and find which of these could cause the disease and which could not. This Dr. Vinson did by adding acetone to the cold juice. This brought down a solid precipitate. The liquid left after precipitation could no longer cause the disease, but a solution of the precipitate could do so. The virus was thus evidently in the precipitate.

Concentrated by Steps

Dr. Vinson's further work has been in the greater refinement and purification of the precipitate, each step obtaining a more concentrated form of the virus. He states that analyses indicate its chemical makeup to be that of a protein or of some compound very similar to proteins. It is regarded as probable, however, that not the whole protein molecule is the real mischief-maker, but some relatively simple group of atoms that is attached to it or a part of it. Such an atom-group could conceivably attach itself to other protein molecules in healthy protoplasm, thus providing a mechanism of infection and propagation.

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SEISMOLOGY

Earthquakes at Opposite Ends of Pacific Ocean

THE ALASKAN coast in the vicinity of the city of Cordova was shaken early Wednesday morning, Sept. 14, by an earthquake of moderate severity. This is indicated by records of seismological stations transmitted through Science Service, and interpreted by the Jesuit Seismological Association headquarters in St. Louis. The time of origin was 3:42 a. m., eastern standard time, and the epicenter was in latitude 60.8 degrees north, longitude 145.6 degrees west.

The bottom of the South Pacific Ocean, at or near Hawkes Bay, New Zealand, received a jolt from an earthquake on the morning of Thursday, Sept. 15. This was also announced by the Jesuit Seismological Association, after examination of data transmitted through Science Service.

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Something YOU HAVE MISSED

HAVE FAMOUS scientists ever told you about fascinating accomplishments in the particular fields in which they work? Wouldn't you like to sit in your home and, at the hour of your choice, listen to Dr. Millikan discuss the rise of physics, or Dr. Welch tell the story of the conquest of the tubercle bacillus? And if a point were not clear to you, wouldn't it be splendid to have that part of the talk repeated?

All these wishes may be yours—made possible by the cooperation of seven great scientists with Science Service in a pioneering venture. On subjects which fired their imaginations, each scientist made a five minute talk recorded on the new process Durium phonograph records.

In addition to the talks by Dr. Robert A. Millikan, Nobel prize winner and head of the California Institute of Technology, and Dr. William H. Welch of Johns Hopkins University, "Dean of American Medicine,"—Dr. John C. Merriam, authority on fossil animals of western America, president of the Carnegie Institution of Washington, speaks on *"The Record of the Rocks;"* Dr. Edwin G. Conklin, Princeton University biologist, one of the world's greatest authorities on life processes, on *"The Mystery of Life;"* Dr. Karl T. Compton, eminent physicist, president of the Massachusetts Institute of Technology, on *"Science and Engineering;"* Dr. Leo H. Baekeland, industrial chemist and one of America's industrial pioneers, inventor of bakelite, velox, etc., on *"Chemistry and Civilization;"* and Dr. William M. Mann, director of the National Zoological Park of the Smithsonian Institution, leading authority on animal life, on *"Our Animal Friends."*

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ENTOMOLOGY

NATURE RAMBLINGS

by Frank Thone

The Devil's Mushroom

OCCASIONALLY we meet with persons so repulsive in body, so malicious of disposition, so crooked of soul, that they restore a belief in an orthodox personal Devil. And there are creatures in the lesser worlds of plants and animals, too, that seem to be explainable only as deliberate inventions of an infinitely malicious intelligence, so offensive are they to every human sense, so devoid of any redeeming feature.

Such an object is the stinkhorn fungus. Of all the fungi its coming is the most goblin-like and sudden, for it bides its time compressed in the hidden egg-like globe beneath the ground, springing from nothing at all to a height of six inches or more in an hour. And where other fungi, even poisonous ones, content themselves with a mysterious and apparently elfin birth, and offer a certain grace, albeit an odd and alien one, to atone for startling us (as Puck might bow and grin when he suddenly appears among the daffodils), this incarnation of uncompromising evil makes no apologies at all. He stands defiantly erect, with the last rag of his restraining swaddling-bands still around him, impudently holding up in the horrified air a black-daubed, slime-smeared head that stinks like the very kettles of Hell.

One friend, and one friend only, the stinkhorn fungus has. Flies. These children of filth know their feast from afar. Guided by the carrion scent they swarm to the stinkhorn's slimy head, and revel there until the putridity is washed away by an obliterating rain or dried by a sun impatient of the affront to his face.

If the ancient Pagans or the medieval Christians, who liked to dedicate flowers to the gods or the saints, had noticed the stinkhorn, there is no doubt who would have been elected to the sinistral honor of its patronage. Pagan and Christian alike would have laid it before the throne of Beelzebub, the Prince of Flies.

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ANTHROPOLOGY

Asselar Man Lived in Sahara When Desert Was Green

THE FOSSILIZED skeleton of a man who lived in the Sahara when it was a green prairie instead of the parched desert it is now was described recently before the Institute of Human Paleontology in Paris, by the French anthropologists Marcellin Boule and Henri Vaillant. Discovered as long ago as 1927, near the French post of Asselar in the Western Sudan, the skeleton has been completely freed of its stony embedding matrix in a cliff near Asselar only within the past few months.

The skeleton, especially the skull, including the face, is well preserved. It was found resting on its back with its knees up in the air, as if the man had fallen thus.

Both geological and palaeontological evidence point to the very considerable antiquity of Asselar man. He belongs to a time when the Sahara was well-watered and fertile. The spot on which he was found was once part of either a lake or a tributary of a neighboring river, which long ago ran dry. No implements were found associated with the remains, though implements of a much later date, yet still belonging to a time when the Sahara was humid, were found on the surface nearby.

The bones were very highly fossilized. They probably belong to the very early part of the upper pleistocene epoch, or later Ice Age.

Prof. Boule thinks Asselar man is the link which is required between early man in Europe and early man in South Africa. He may, he thinks, represent an ancestral stock in northwest Africa which split into two, one part going north to Europe and developing into Crô-Magnon man of the Upper Palaeolithic and the other branch going south and developing into Boskop man—the type which is ancestral to the Bushmen, who are a highly specialized race—and of the Hottentot and Bantu peoples.

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An improved nail, which is said to hold from two to three times as tightly as the ordinary article, has been invented by the Forest Products Laboratory at Madison, Wis. Instead of being smooth, its surface is etched by a chemical process with minute pittings. A patent dedicating the process to the free use of the people has been applied for.

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ETHNOLOGY

Strange Trances Grip Small Group of Balkan Women

A REMARKABLE state of trance which occurs among Rumanian women of Duboka, a village in eastern Serbia, and the ceremonial employed for its cure have been observed and described to the Folklore Society of London by R. P. Brown and Mrs. E. C. Brown.

The phenomenon occurs once a year, during a fair held on the village green on Whitsunday. Peasants crowd in from the countryside to attend. The trances are confined to women of the Vlach race and to those who belong to certain families. While a woman is in a trance she is gifted with "second sight" and prophesies. One young woman predicted the war and named those who would return from it. Sometimes the patient sings.

Prophesy While Struggling

When the village green is crowded and all are dancing or feasting, a woman sitting with her family will begin to look melancholy, cry, and then fall unconscious. She is laid on a blanket, some of her relatives kneeling by to hold her when she begins to struggle. Music and dancers are sent for, and it is usually while waiting their arrival that the patient, struggling, though not violently, begins to prophesy, or sings.

The dancers, usually three men and three young girls, line up in a certain order, the man who leads holding an unsheathed knife, the girls flowers, and the man who closes the line either the sheath of the knife or a second knife.

When the music begins they circle round the patient, who now struggles violently, and as the first man passes her head he makes the sign of the cross on her belt. A formula in archaic language is shouted at her.

Repeated Several Times

After a period the patient is raised and carried, still struggling violently, for some fifty yards where the performance is repeated. Usually the cure is effected at the third or fourth station; but sometimes as many as nine are required. At one or more of the stations a son or other relative chews green garlic and wormwood and spits it over the patient. After the cure, the patient is described as looking "tired, but reasonably well and pleased with herself."

The trances may be epileptic, due to inbred weakness of a population said to be riddled with syphilis, or they may be an aggravated form of the hysteria which, producing peculiarly violent hiccoughs, is prevalent among women of the Balkans.

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MEDICINE

Claims Micro-Movies Show Germs Have no "Life Cycle"

MICRO-MOTION pictures of germs growing under different conditions show that these tiny organisms have no "life cycle" and no filterable form, as some investigators have claimed, Dr. Ralph W. G. Wyckoff of the Rockefeller Institute for Medical Research here has reported to *Science*.

Chief exponents of the life cycle and filterable phase theory are Dr. Philip Hadley of the University of Michigan and Dr. A. I. Kendall of Northwestern University. These investigators, by using special growth materials and foods, claim to have been able to induce ordinary bacteria or germs to develop in a form that passes through very fine-pored filters. They believe that this filterable form of the germ represents a definite stage in its life cycle previously unknown to scientists, but one through which it always passes.

Dr. Wyckoff does not agree with this. His theory, based on his moving picture studies, is that when these germs are given different food and environment, they may have to change their shapes and sizes, but it is only an Alice-in-Wonderland adaptation to their changed circumstances, and not part of their life cycles. As soon as possible, when their food and environment permit, they go back to their original forms.

Likewise, he does not think that the germs have a filterable form distinct from their usual one. His studies led him to the opinion that the change in food and growth material enables the germs to pass through filters, not by changing their forms but by another process which may, for instance, make them more slippery or more compressible. The K medium itself, Dr. Wyckoff pointed out, on which Dr. Kendall was able to grow filterable forms of bacteria, has been found to aid the passage of normal germs through fine filters.

Dr. Wyckoff made 6,000 feet of film covering 600 hours and showing the growth of the Shiga bacilli, which are the cause of one form of dysentery. These are the same germs that Dr. Hadley filtered after growing them on media containing lithium chloride. They are related to the typhoid bacilli, which Dr. Kendall passed through a filter after growing on his special K medium.

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PSYCHOLOGY

Vibrations of Tuning Fork Turn Eye Into Stroboscope

ENGINEERS can see the parts of a revolving motor as though they were standing still. Singers can test the pitch of their voices by watching a revolving phonograph disc. And this without any complicated apparatus, Dr. Milton Metfessel, University of Southern California, has reported to the American Psychological Association.

Such effects are produced through the principle of stroboscopy, applications of which already make possible the photography of rapidly whirling objects. A tuning fork held against the head will vibrate the eye in synchronism with the disc, making the eye function only at the time that the disc reaches a certain position. The whirling disc then appears at a standstill.

Singers can learn to cause the eye-blinding vibration with their voices, Dr. Metfessel said. A low or middle C will make the spokes of a disc turning at 80 revolutions per minute appear motionless.

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• First Glances at New Books

Floriculture

LIVING WITH OUR FLOWERS—Mrs. William Stanhope Rowe—*Stewart Kidd,* 374 p., $3. The average person who undertakes to have a few flowers about the place finds floriculture a most discouragingly cyclic affair: abundance in spring and early summer, dearth in late summer, renewed abundance in the fall and collapse in winter. Mrs. Rowe's book gives valuable suggestions on how to iron out these booms and depressions, and keep an even flow of good flowers available all the year through. There are also valuable chapters on floricultural methods, and an annotated list of good garden flowers.

Science News Letter, September 24, 1932

General Science

AN INTRODUCTION TO SCIENCE. BOOK I: THINGS AROUND US—E. N. da C. Andrade and Julian Huxley—*Blackwell,* 184 p., 2s 3d. English school children are to be envied: scientists with outstanding reputations do not consider it beneath their diginity to write books for them. And this first of a series of three elementary science books is a good job, too: written on a level with the pupils for whom it is intended, but free from any taint of "writing down"; brightly illustrated.

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Education

PATHWAYS IN SCIENCE—Gerald S. Craig and others—*Ginn,* six volumes, 76c each. This series is designed to bring the study of science to the elementary grades to begin when the pupil has just been graduated from his primer. The material is well prepared and should make these grades more interesting to both teacher and pupil.

Science News Letter, September 24, 1932

Psychology

THE SCIENTIFIC DREAM BOOK—Jonathan B. Westerfield—*Brewer, Warren and Putnam,* 317 p., $2.50. Here you will find the modern parallel of the old fashioned dream dictionary—you may look up the principal word in your dream and read an interpretation. The volume would probably provide excellent entertainment, but perhaps some embarrassment at a party. Scientists will wonder why the work is published anonymously, for the name Westerfield, the publisher tells us, "cloaks the identity of two collaborating authors, one a practising psychologist of wide experience and unquestioned reputation, the other a journalist, who is married to a psychologist." The interpretations seem to be sufficiently vague to apply in most cases.

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Sociology-Economics

PROHIBITION: A NATIONAL EXPERIMENT—Edited by James H. S. Bossard and Thorsten Sellin—*American Academy of Political and Social Science,* 269 p., $2. This volume is an attempt to show the effects of prohibition on various phases of American life in the last ten years, as seen by experts in various fields. There is a section devoted to the future of prohibition and the last chapters describe the liquor traffic in Canada, Great Britain, Sweden, Finland and Russia. The volume contains much of interest for both advocates and opponents of prohibition, and deserves thoughtful reading.

Science News Letter, September 24, 1932

Chemistry

MARVELS OF MODERN CHEMISTRY—B. L. Clarke—*Harper,* 374 p., $3. Chemistry progresses so rapidly, both in its growth as a science and in its application to the arts, that new books for popular consumption are always sure of a welcome, and their constant renewal is really a necessity. In this condition the present well-illustrated work finds its sufficient apologia.

Science News Letter, September 24, 1932

Radio

RADIO OPERATING QUESTIONS AND ANSWERS—Arthur R. Nilson, J. L. Hornung—*McGraw-Hill,* 356 p., $2.50. A fourth and revised edition of a book that has proved continuously useful since the rise of radio to a major industry.

Science News Letter, September 24, 1932

Chemistry

SYMPOSIUM ON RUBBER—*American Society for Testing Materials,* 159 p., $1.75. Valuable technical papers read at a symposium this year are in this booklet incorporated into the permanent literature.

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Zoology

POLLWIGGLE'S PROGRESS.— Wilfrid S. Bronson—*Macmillan,* 122 p., $2. The artist-author here sustains the high standard he has set for himself in *Fingerfins* and *Paddlewings.* Pollwiggle is a tadpole who grows up to be a big bullfrog; he is individualized but most carefully not anthropomorphized: Mr. Bronson knows how to make his animals interesting to human beings without endowing them with bogus human traits. For all its value as entertainment for children of all ages up to ninety-plus, the book remains good natural history, and better-than-good animal drawing.

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Engineering-Juvenile

THE STORY OF STEEL—V. S. Spencer—*Laidlaw Brothers,* 127 p., $1. Narrative of a boy's sightseeing trip through a steel mill.

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Botany

A REVISION OF THE GENUS COSMOS—E. E. Sherff—*Field Museum,* 47 p., 50c. A revision of a genus including one of the most popular of late-summer garden flowers, by one of the leading students of the taxonomy of the compositae.

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Entomology

NEW WEST INDIAN CERAMBYCID BEETLES—W. S. Fisher—*Smithsonian Inst.,* 93 p. Of interest to systematic entomologists.

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Engineering

BLUEPRINT READING—Robert H. Fortman and James McKinney—*American Technical Society,* 154 p., $1.50. A practical handbook for the machine trades.

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Highway Engineering

HIGHWAY RESEARCH BOARD PROCEEDINGS—Edited by Roy W. Crum—*National Research Council,* 443 p., $2. These proceedings of the eleventh annual meeting contain many research reports of fundamental value in design, materials, construction and maintenance of highways as well as in traffic and economic problems.

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